

DETAILED ACTION

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with the applicant's attorney, Robert Bushnell, on March 11, 2008.

2. The application has been amended as follows:

In the Claims

AMENDMENTS TO THE CLAIMS

Please amend claims 1, 9 and 10, as follows:

Listing of Claims:

1. (Currently Amended) A distributed router, comprising:
a plurality of line connection units;
a main processor disposed to construct and manage a routing table, to receive changes of routing information from adjacent routers, update the routing table, and to broadcast changes of routing information received through internal InterProcessor Communication paths within the distributed router;

a switching unit coupled to switch transmission of packets between the line connection units and the main processor;

a plurality of forwarding tables positioned in different corresponding ones of the plurality of line connection units, to copy, store and manage parts of the routing table; and

a plurality of forwarding processors positioned in different corresponding ones of the plurality of line connection units, to receive the changes of routing information broadcast by the main processor through the internal InterProcessor Communication paths of the distributed router, to update different corresponding ones of the forwarding tables, to ascertain a source address of a packet received, to ascertain an output direction of a packet ~~received from~~ having a source address of an external router by looking-up forwarding information in corresponding ones of the forwarding tables for the packet received from the external router, and transmitting the packet to the output direction ascertained, to determine whether an output direction of a packet ~~received from~~ having a source address of the switching unit is toward an external router or toward the switching unit by looking-up the forwarding information in the corresponding forwarding table for the packet, to transmit the packet to the external router when the determined output direction of the packet is toward the external router, and to discard the packet when the determined output direction of transmission of the packet is toward the switching unit.

2. (Previously Presented) The distributed router of claim 1, wherein the main processor comprises:

a plurality of input/output interfaces handling packets transmitted and received to and from the switching unit;

a switch interface buffering packets transmitted and received via the input/output interfaces, and interfacing with the switching unit; and

a routing table lookup and management unit receiving packets from the input/output interfaces through the switch interface, and transmitting packets received to the input/output interfaces in conformance with routing information stored in the routing table, and receiving the changes of routing information from external routers, updating the routing information with the changes of routing information, and transmitting updated routing information to the forwarding processors through the internal InterProcessor Communication paths of the distributed router.

3. (Previously Presented) The distributed router of claim 1, wherein each of the forwarding processors comprises:

an Internet Protocol packet receiving unit for extracting an IP header field from each incoming packet;

an IP header analyzing unit extracting an IP address required for lookup control from each IP header received from the Internet Protocol packet receiving unit;

a lookup table storing address indices for the forwarding tables where information on each packet is stored;

a lookup control unit latching the address of the forwarding table intended for reference from the lookup table using the IP address extracted by the IP header analyzing unit, reading forwarding information from the forwarding table, when a packet is received from the switching

unit and an output direction of the packet is toward an external router, making a determination to transmit the packet to the external router, when a packet is received from the switching unit and the output direction of the packet is toward the switching unit, making an determination to discard the packet, and when a packet is received from an external router, transmitting the packet to an output address associated with the packet;

an IP header changing unit changing information of the IP header of each packet based on the forwarding information obtained by the lookup control unit; and

an IP packet transmitting unit transmitting the stored packets according to the changes in information for the header of each packet to the external router.

4. (Previously Presented) A distributed router, comprising:

a plurality of line connection units;

a plurality of main processors positioned in corresponding different ones of the plurality of line connection units, to construct and manage a routing table, receive changes in routing information from adjacent routers, update the routing table, and broadcast changes of routing information through IPC paths of the distributed router;

a switching unit switching packets received from the line connection units to corresponding ones of the line connection units to which these packets are transmitted;

a plurality of forwarding tables positioned in corresponding different ones of the plurality of line connection units, to copy, store and manage parts of the routing table; and

a plurality of forwarding processors positioned in corresponding different ones of the plurality of line connection units, to ascertain an output direction of a packet received from an

external router by making a lookup in a corresponding one of the forwarding tables and transmit the packet received to the output direction ascertained, to determine whether an output direction of a packet received from the switching unit is toward an external router or the switching unit by making a search of forwarding information stored in the corresponding one of the forwarding tables for the packet, transmit the packet to the external router when the output direction is toward the external router, and discard the packet when the output direction is toward the switching unit, and update the forward table in response to reception of changes in routing information broadcast by the main processor through the internal IPC paths of the distributed router.

5. (Previously Presented) A ping-pong preventing method using a distributed router, comprising:

a step 1 in the distributed router having a switch unit connecting a main processor and a plurality of line connection units, of the main processor updating a routing table, and transmitting changes of routing information to respective line connection units through internal paths of the distributed router, when the main processor receives changes of routing information from an adjacent router;

a step 2 of a forwarding processor positioned in each of the line connection units updating a forwarding table in response to reception of the changes of routing information broadcast from the main processor through the internal paths of the distributed router; and

a step 3 of the forwarding processor receiving a packet from one of an external router and the switching unit, ascertaining input and output directions of the packet, transmitting the packet

received from an external router to the switching unit, discarding the packet received from the switching unit when the output direction of the packet is toward the switching unit, and transmitting the packet received from the switching unit when the output direction of the packet is not toward the switching unit.

6. (Original) The method of claim 5, wherein step 1 of updating the routing table, comprises:

a step 1-1 with the main processor updating the routing table when the main processor receives the changes of routing information;

a step 1-2 with the main processor adjusting changes in a routing path to fit the forwarding table of each of the line connection units; and

a step 1-3 with the main processor transmitting the changes of the routing information to the respective line connection units through the internal paths of the distributed router.

7. (Previously Presented) The method of claim 5, wherein step 3 of the forwarding processor ascertaining input and output ports, comprises:

a step 3-1 with the forwarding processor ascertaining the output direction of the packet received from an external router by searching the forwarding table and transmitting the packet according to the output port ascertained;

a step 3-2 with the forwarding processor ascertaining the output direction of the packet received from the switching unit by searching the forwarding table, and transmitting the packet when the output direction is toward an external router; and

a step 3-3 with the forwarding processor ascertaining the output direction of the packet received from the switching unit by searching the forwarding table, and discarding the packet when the output direction is toward the switching unit.

8. (Previously Presented) The method of claim 5, wherein the forwarding processor receiving a packet from one of an external router and the switching unit, and ascertaining input and output directions of the packet in step 3 comprises:

a step of the forwarding processor extracting an IP header from an incoming IP packet;
a step of the forwarding processor extracting an IP address for lookup control from the IP header; and
a step of the forwarding processor ascertaining the output direction by using the IP address to make a search of forwarding table using the IP address.

9. (Currently Amended) A router with a distributed architecture, comprised of:
~~a main processor updating routing information stored in a routing table and broadcasting changes in said routing information constructing and managing a routing table, receiving changes of routing information from adjacent routers, updating the routing table, and broadcasting changes of routing information received through internal paths within the distributed router;~~

a plurality of line connection units;
a switching unit directing transmission of packets between said main processor and said line connection units;

each of said line connection units comprising:

a forwarding table storing a copy of parts of said routing table, and
a forwarding processor making a discontinuance of transmission of any packet received by a corresponding one of said line connection units from said switching unit and designated by a destination address to be subsequently forwarded to said switching unit, determining source addresses of received packets, transmitting any packet ~~received from having a source address of~~ said switching unit to a destination address associated with the packet if the destination address does not correspond to said switching unit, and transmitting any packet ~~received from having a source address of~~ an external router to a destination address associated with the packet.

10. (Currently Amended) The router of claim 9, with said forwarding processor comprised of:

when the packet has ~~been received from a source address of~~ said switching unit and said destination address of the packet indicates that an output direction of the packet is toward an external router, transmitting the packet to the external router,

when the packet has ~~been received from a source address of~~ said switching unit and said destination address of the packet indicates that an output direction of the packet is toward said switching unit, making said discontinuance, and

when the packet has ~~been received from a source address of~~ an external router, transmitting the packet to a destination address associated with the packet.

Conclusion

3. Any response to this Office Action should be **faxed to (571) 273-8300 or mailed to:**

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Hand-delivered responses should be brought to

Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

4. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Sai-Ming Chan whose telephone number is 571-270-1769. The examiner can normally be reached on Monday - Friday 8:00-5:00 EST.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Seema Rao can be reached on 571-272-3174. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR

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system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or 703-305-3028.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist/customer service whose telephone number is (571) 272-2600.

/Sai-Ming Chan/

Examiner, Art Unit 2616

March 13, 2008

/Seema S. Rao/
Supervisory Patent Examiner, Art Unit 2616